# Idaho State University/ IAC Nuclear Energy Science Education and Research

**Frank Harmon**
**Idaho Accelerator Center**
**Idaho State University**


**August 2003**
**AFCI Semi Annual**

# ISU/IAC Program Elements

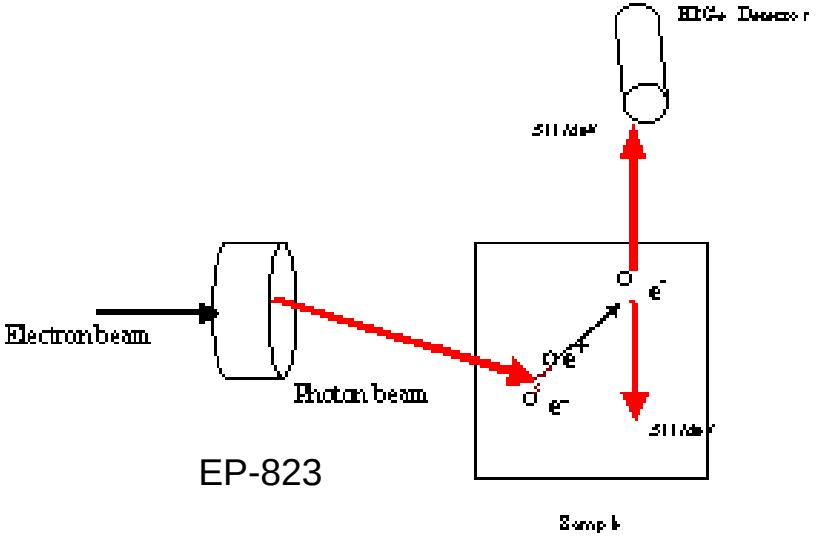
- Students, post-docs, faculty, staff and administration.
  - 3 Grad students, 3 Undergrads, 2 US visiting, 3 FSU students
  - 3 summer faculty
  - 1 research faculty
  - 6 staff, engineers, financial administration etc.

- Accelerator based Materials Research. Positron Annihilation Spectroscopy (AG-PAS)for materials defect analysis
  - Comparison tests with UNLV and LANL samples
  - AcPAS accelerator upgrade
  - Portable system prototype

- Accelerator based nuclear research
  - Design construct and test Lead/LBE accelerator target for OS neutron irradiations
  - Radiation effects testing of OS
  - Continue neutron production experiments for future inter-collegiate ADSS research
  - Planning for inter-collegiate ADSS collaborations including licensing issues
  - Dose Conversion Coefficients project

# Accelerator Based Materials Research Positron Annihilation Spectroscopy (AG-PAS) for Materials Defect Analysis

Tests with UNLV and LANL samples

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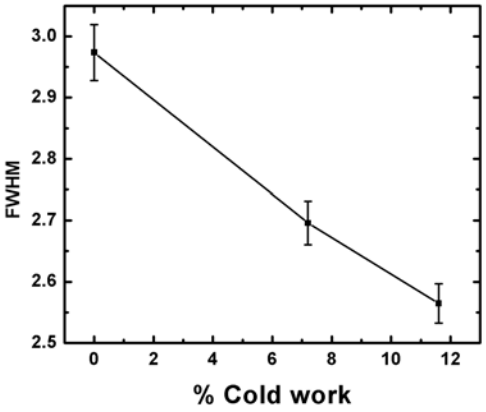
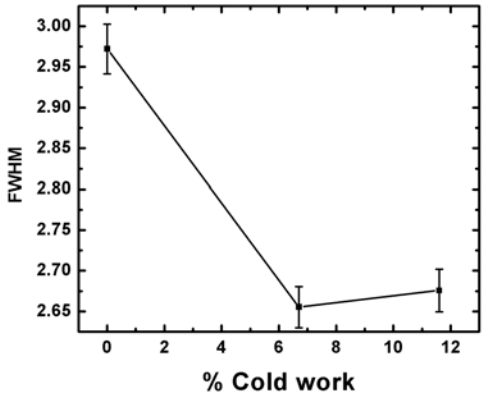
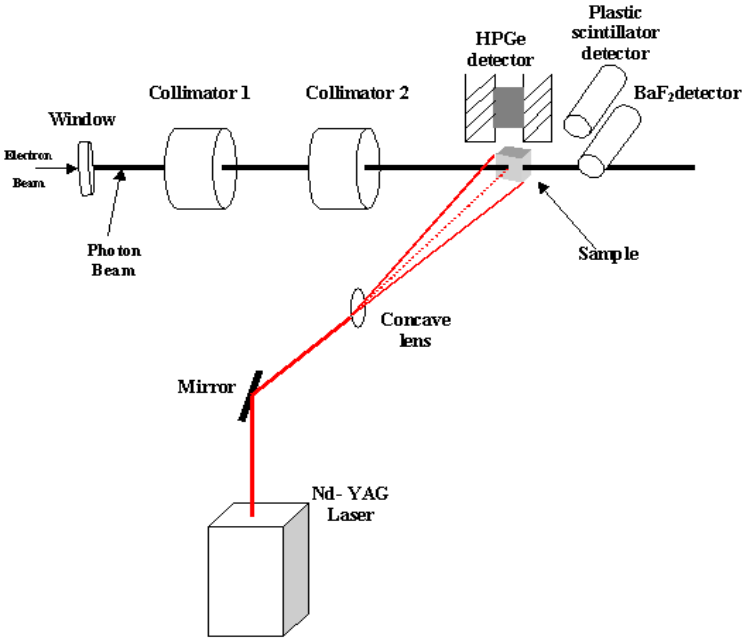



SS-304L

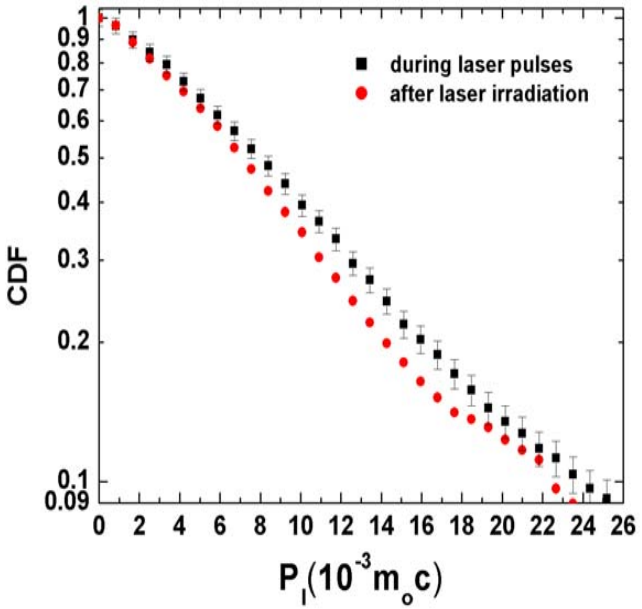


# New Directions in AG-PAS

The first dynamic measurements of the electron momentum distributions during structural changes in material induced by laser excitation



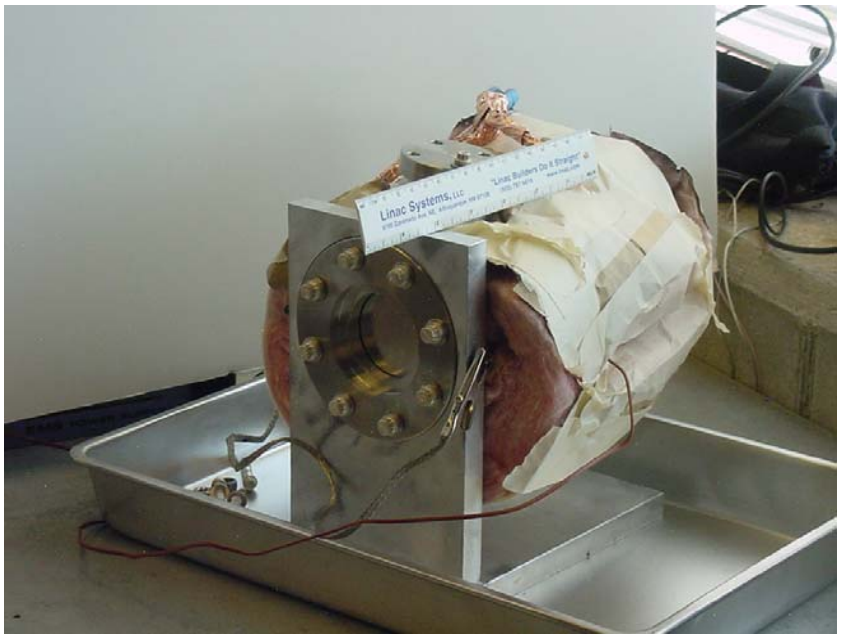

Laser pulses on Si crystal

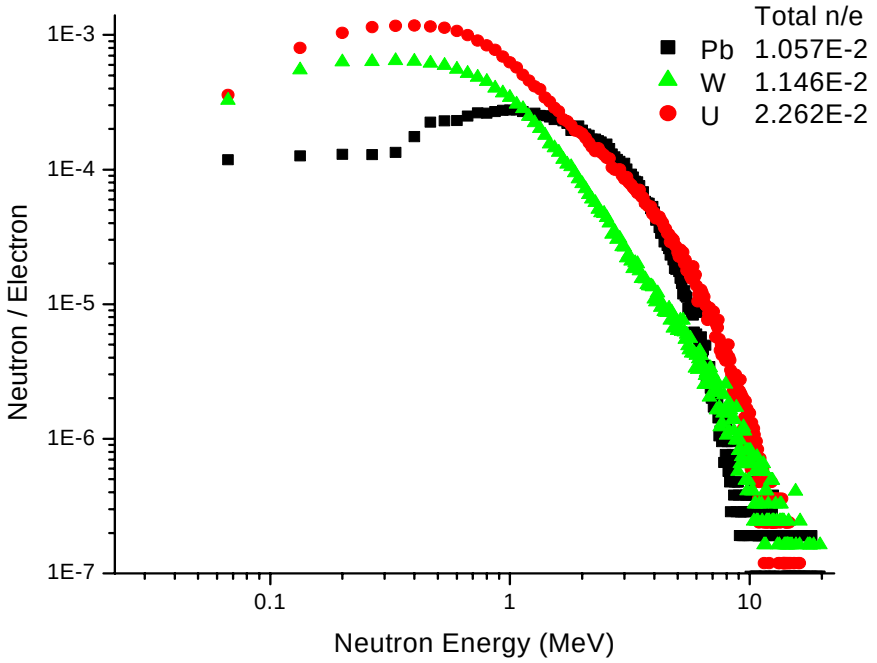


# AG-PAS High Rep Rate Accelerator and Portable System Prototype

# Accelerator Based Nuclear Research

Design construct and testing of  Lead/LBE accelerator target
for OS neutron irradiations



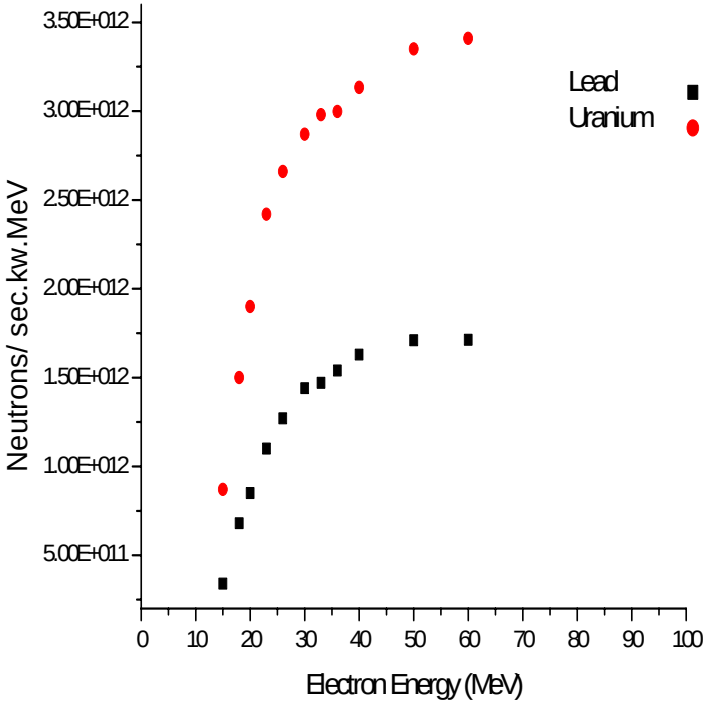
# Accelerator based nuclear research (cont.)

Planning for inter-collegiate ADSS collaborations

- Denis Beller is coordinating inter-collegiate ADSS planning with ISU, UT Austin, TX AM and others for use of their reactors for a series a research and training ADSS facility.
- License modification request to NRC underway for use of ISU sub-critical assembly in a low power demonstration experiment at the IAC.
- ADSS Workshop held at ISU Aug. 21-22, 2003.
  Speakers: Denis Beller (ISU/IAC), Frank Harmon (ISU/IAC), Bill Charlton (UT-Austin & Texas A&M), Frank Goldner (DOE/NE), Mike Cappiello (LANL), George Imel (ANL), Eric Pitcher (LANL), John Bennion (ISU), John Lee (UT-Austin & Texas A&M), Eric Loewen INEEL), Doug Crawford (ANL-W)

# Accelerator based nuclear research (cont.)

Continue neutron production experiments for future inter-collegiate ADSS research



# Dose Conversion Coefficients

There is little Health Physics experience with many of the radionuclides that may be generated in spallation targets. Work so far is based on a proposed mercury target scenario where 83 such radionuclides have been identified. A task group composed of collaborating scientists from Oak Ridge National Laboratory, Idaho State University, the University of Nevada Las Vegas, and Tbilisi State University in the Republic of Georgia, has been established to review these radionuclides and calculate fundamental Health Physics Information for each radionuclide identified. The following summarizes recent progress:

- Protocols for the determination and verification of radionuclide data and QA/QC procedures for the calculation of radionuclide health physics coefficients have been developed.
- Dose conversion coefficients for 6 radionuclides have been completed and are ready for publication.
- Draft coefficients for an additional 31 radionuclides are under review. The dose coefficients for these 31 values are expected to be approved within the task group for publication.
- The draft values for an additional 18 radionuclides are expected to be completed by December 2003.